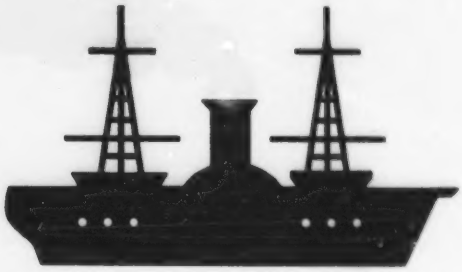
HALIFAX
REGIONAL MUNICIPALITY



Preserving the Environment of Halifax Harbour

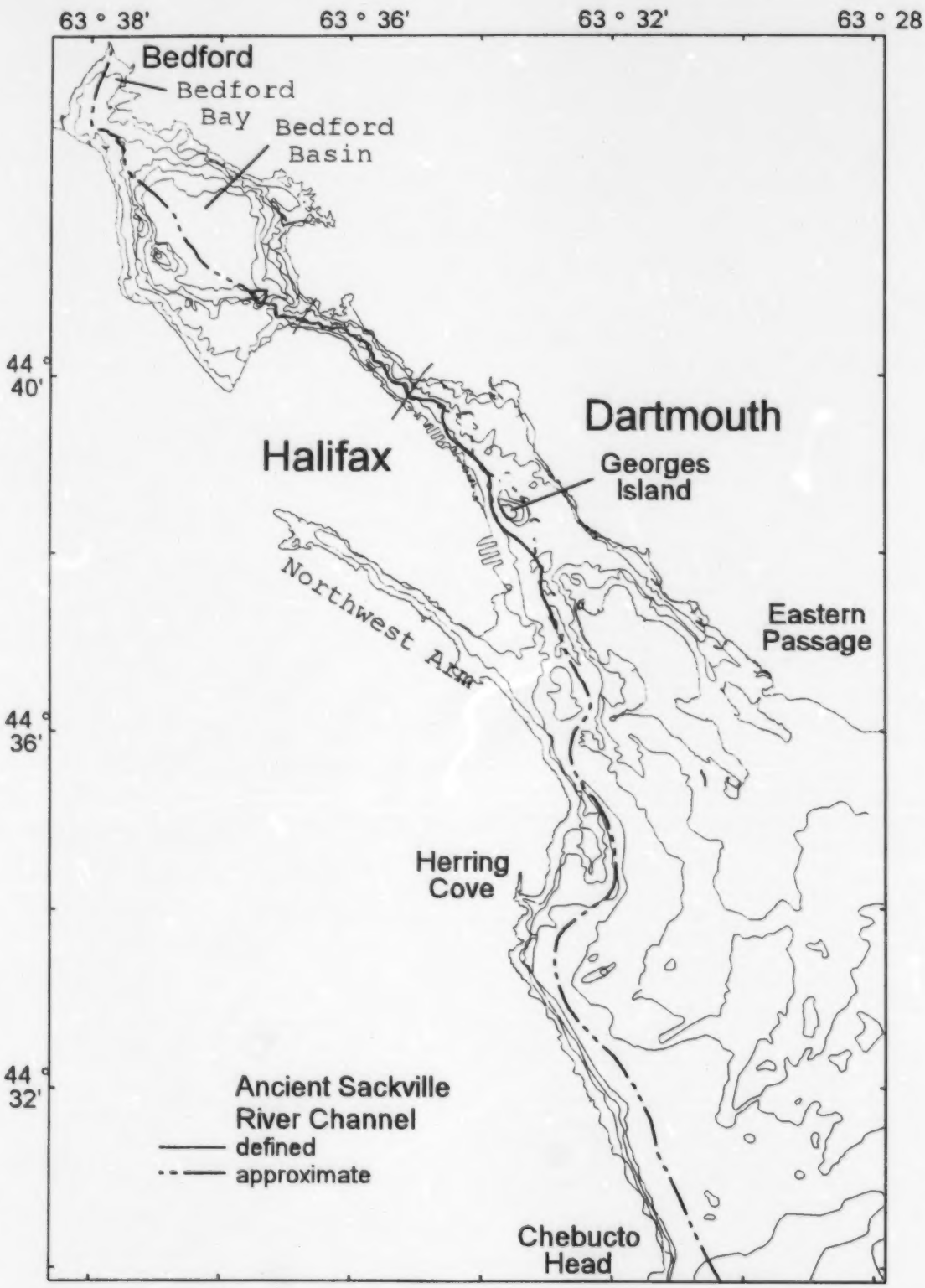
CALL FOR ACTION

WORKSHOP #1
WORKSHOP #2

Halifax Regional Municipality
Fisheries and Oceans Canada

Fisheries and Oceans Canada
Pêches et Océans Canada

Canada


63 ° 38'
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Bedford
Bedford Bay
Bedford Basin
44 ° 40'
Halifax
Dartmouth
Georges Island
Northwest Arm
Eastern Passage
44 ° 36'
Herring Cove
44 ° 32'
Ancient Sackville River Channel
defined
approximate
Chebucto Head

103-00067/

Preserving the Environment of Halifax Harbour

Call For Action

Workshop # 1 **Workshop # 2**

This document is an executive summary of two Workshops held at the Bedford Institute of Oceanography on March 14-15th/2000 and 2001. The workshops were conceived and developed by the staff of the Habitat Management Division of Fisheries and Oceans Canada in partnership with the Halifax Harbour Solutions Project of the Halifax Regional Municipality who graciously offered their support by taking active part in the delivery of the agendas and by defraying all printing costs. Workshop # 2 was the sequel of the preliminary workshop (# 1) held one year previous.

Additional Copies of this executive summary, and limited copies of the Proceedings of both workshops are available from the following address:

Habitat Management Division,
Fisheries and Oceans Canada,
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The full text of the presentations and discussions of both workshops are published in the respective proceedings of these events.

Part 1

Introduction: Workshop organizers

It appears reasonable to assume that around 1749, when the first white settlers chose to establish a new town on the Halifax peninsula, the inlet was teaming with life of all sorts, as were the wild shores around. "....The harbour itself is full of fish of all kinds..." wrote Cornwall is in his first report to the authorities at London.

The new town prospered and grew during two and a half centuries of ever increasing commerce and industry. The Halifax Inlet[1] became one of the great harbours of the world. It has witnessed the shipping activities of two world wars as well as long years of peacetime industrialization. Cities and towns developed on its shores, and the overall population has grown beyond the wildest imagination of any 18th century visitor to these shores.

The Canadian Constitution Act of 1867 gave free navigation priority over all other uses within public harbours areas. The Act Confirmed that harbours are the property of the federal government in Canada and harbour jurisdiction extends to the seabed and foreshore that are used for shipping activities. In 1927 another Act of parliament created the Halifax Port Corporation to manage and administer this and other public harbours. In present days thirteen federal and five provincial jurisdictions also regulate the Halifax inlet. Many non-regulatory stakeholders (waterfront development corporations, waste water treatment operators, shipping facilities and land developers) are actively modifying the Harbour watershed, its shore profile and the biological and physical characteristics of its fresh and saltwater regime.

Notwithstanding the greatness of its history, the Halifax Harbour in some respects is presently reduced to a shadow of its former beauty. At first glance the water still sparkles in the sun but many coves and shore areas reveal the presence of contamination and pollution. Large volumes of raw or only partially treated domestic sewage are presently released at numerous points in the harbour. The anaerobic sediments are contaminated with heavy metals (mercury, lead, zinc, copper and cadmium) and organic pollutants (PCB's and PAH's) are present in high concentrations in some localities.

Much of the shoreline has been bared of its green mantle to make way for industry's facilities and for general urbanization purposes. Many of the animal species (particularly fish) that once were abundant in the inlet and its freshwater tributaries have dwindled to un-harvestable levels because their habitats have shrunk as a result of human activities. Some species still abound but can not be safely consumed by humans because they are contaminated (i.e. bivalves). Large areas of rich shoreline habitats have been buried by in-filling projects to create more waterfront space for buildings, wharves, warehouses etc.

A surprisingly large fishing effort still occurs in all parts of the Halifax Inlet. Lobster is the principal species but many fin fish are also harvested on an occasional or part time basis. This fishery is a small fraction of the total provincial catch but the yield is sufficiently elevated to attract serious full time fishers. In

[1] The terms Halifax Inlet and Halifax Harbour as used throughout this document are interchangeable; for a definition of the term harbour (=inlet) applicable to this initiative, refer to "Chair's Summary: Objectives of Workshop # 2, which is included in part 1 of this document.

the early 90's some 70 fishers worked the area on a part or full time basis which leads to the conclusion that the Halifax Inlet is alive and remains a significant fishing ground.

The citizens of the Halifax Regional Municipality, the secondary stake- holders, have a great interest in their harbour as an industrial development tool. They are also interested in the preservation of the great boating, fishing, whale watching and other recreational potential offered by the protected waters of the Inlet and the Point Pleasant and MacNabs Island parks. The waterfront itself attracts countless visitors each year and this represents a significant source of income for the city in particular and the province in general.

Clearly both the natural beauty and the physical assets of the Harbour, including the extensive harbour development, constitute a subject of pride and attraction for residents and visitors to the area. However many problems are facing the resource managers and developers in their efforts to harmonize their environmental preservation activities. Some of these problems relate to the multiplicity of jurisdictions over the Harbour. Many of the applicable regulations are not known or are poorly understood. In order to reduce the risk of confusion there is a need to;

1- clarify jurisdictional boundaries (13 Federal & 5 Provincial Acts).

2- Elaborate plans for future integration of management activities.

3- Form Partnerships to undertake certain restoration activities deemed feasible.

4- Protect and restore surviving wildlife habitat and restore the aesthetic values to the degree deemed possible.

The two day workshop of March 2000 was primarily to assess the interest of regulatory and non regulatory agencies in new initiatives for the restoration and preservation of environmental and aesthetic values of Halifax Harbour. It was also intended to bring together those who can most readily bring about or influence a new climate of collaboration concerning such matters.

As the Halifax Regional Municipality is entering a time of burgeoning activities, it was felt that the moment was opportune to such initiative in concurrence with other large projects, ongoing or proposed, such as those of the Waterfront Development Corporation and the renewed pollution abatement efforts by the Municipal government (HRM's Harbour Solutions Project).

Workshop #1 in March 2000 resulted in:

1- Improved clarification of jurisdictional boundaries between regulatory bodies and an agreement in principle to co-operate in the integration of regulatory functions within the Halifax harbour and its watershed:

2- The confirmation of Halifax Harbour as a living ecological entity

3- Agreement on the need for the assessment of the environmental implications of future development activities in Halifax Harbour.

4- Agreement on the need for the preservation and restoration of fish and wildlife habitats and aesthetic values in Halifax Harbour.

Workshop # 2 of March 2001 opened with an unequivocal statement of the DFO objectives and mandated responsibility for the future of Halifax Harbour's biological environment as a fish Habitat. This was followed by a review of the state of environmental knowledge

particularly with regards to the ichtyofauna, the benthic fauna and the bird life in the Harbour. Several presentations told the history and present state of the contaminants (heavy metals and organics) present in the sediments and the water column. The geological history of the Halifax Inlet as it relates to present day marine habitats was presented. Participants heard a discussion on major developments of the past. Present and proposed major development activities and their potential impacts were discussed briefly. Participants also received updates on HRM Domestic sewage and other contaminants (source control) abatement projects. Key presentations focused on precedent case examination as well as ways and means to eliminate or reduce contaminants and recover lost habitats. A presentation on the community perspective on preserving the environment of Halifax Harbour completed the various points of view on the subject of Halifax Harbour environmental protection.

Perhaps the most important product of workshop # 2 was the formulation of a vision statement concerning the future of Halifax Harbour and of a series of specific recommendations on how and who should work toward achieving that vision.

Chair's Summary: Workshop # 1
Recommendations-Brian Nicholls

Preserving the Environment of Halifax Harbour, Workshop #1, was held on March 14-15, 2000 (Appendix A). The first day-and-a-half of the workshop consisted of sessions in which papers were presented under the following topics:

(1) Halifax Harbour – An Ecological Entity;
(2) Anthropogenic Stresses;
(3) The Regulatory Environment;
(4) Non-Regulatory Primary Stakeholders.

Six poster papers were also on display that presented information on the harbour and its environment. Based on the workshop presentations, a "Matrix of Human Activities vs Regulatory and Administrative Responsibilities in Halifax Harbour" was produced, and is included as an appendix to the published proceedings.

The main purpose of this first workshop was to gauge the interest of regulatory agencies and non-regularity stakeholders in the proposed launching of a new initiative on the restoration and preservation of Halifax Harbour. It was not the intention that this first workshop should develop and approve specific recommendations in support of such an initiative, its purpose being to ascertain the level of interest by participating agencies. However, on the final afternoon, and as a key part of the workshop process, the opportunity was provided to participants to take part in discussion groups under the theme "Looking into the Future." There were six such groups, and their findings (identified issues and suggested actions) are presented below by broad category.[1]

Purpose, objectives of proposed initiative to preserve the environment of Halifax Harbour

- need for common vision of the harbour
- produce "White Paper" on goals & objectives

Lead /coordination mechanism/forum

- decide mechanism, e.g. lead agency, small group of key players. "benevolent dictator"
- majority of participants considered that lead should be HRM
- role of HRM needs clarifying
- need for champion(s)

Consultation

- develop process to determine peoples' needs
- get the public involved
- seek input from the local community, including watershed groups & schools

Planning & management

- develop harbour management plan that includes "all the pieces"
- need for integration of the existing "regulatory maze"
- need for harbour-use zoning (tie-in land uses)
- examine governance models
- address regulatory, etc. overlaps among various levels of government, departments, etc.
- include public health issues

Information requirements

- list of experts
- information pamphlets on regulations, approvals, etc. specific to different types of proposal

- review of previous studies of the harbour
- review of similar initiatives elsewhere
- symposium on Halifax Harbour
- baseline inventory

Specific suggestions re: preserving the environment of the harbour

- improve public access, e.g. walking paths
- clean-up of floatables, etc. by community groups
- enhance existing fish habitat
- create new fish habitat, e.g. artificial reefs
- address habitat needs of wildlife other than fish
- safeguard wetlands
- address known key issues e.g. leaching of solid waste deposits, contaminated sediments

Public relations and education

- public education & public awareness are important; need for plan to address these
- publicize successes

The findings of Workshop # 1, as summarized above (and as presented in more detail in the published proceedings), were not formally adopted by the workshop. They are herewith presented as provisional findings for the information of Workshop # 2.

Note that while each individual discussion group focused on a specific topic (provided by the organizers – refer to proceedings for details), this summary combines the findings of all groups according to common categories

Chair's summary: Objectives of Workshop #2-Brian Nicholls

The presentation by Jim Ross of DFO's Habitat Management Division sets the scene for this workshop. As we deliberate on the preservation of the environment of Halifax Harbour over the next two days, please bear in mind DFO's aspirations and objectives for the management of the harbour's environment as outlined by Jim.

This workshop has been organized by Andre Ducharme on behalf of the Federal Department of Fisheries and Oceans (DFO) and the Halifax Regional Municipality (HRM). Andre, who is retired from DFO (Head of Habitat Management), invited me, another retiree, to chair the event. I worked at BIO for many years, my last position being Head of Environmental Assessment in the Marine Environmental Sciences Division. I was involved in Halifax Harbour environmental issues in the late-1980s and throughout the 90s, serving, for example, as a member of the Halifax Harbour Task Force.

In my remarks this morning I shall review the objectives of the workshop, but before I do this, I want to provide you with some background information.

You will note that the title of the workshop is "Preserving the Environment of Halifax Harbour." By way of clarification:

- - **preserving** is used here in a general sense, and is intended to include the protection, conservation, restoration and enhancement of the harbour

- - **environment** encompasses the marine environment, which provides the habitat[2] for the fish of the harbour; but in addition to the marine environment we shall also be addressing the other environments of the harbour, i.e. adjoining freshwater systems, the land around the harbour that provides important habitat for wildlife other than fish, and also the atmospheric environment.

- - **Halifax Harbour** includes Bedford Basin, the Narrows, the Inner Harbour, the Middle Harbour, the Outer Harbour, and the Harbour Approaches (extending out to approximately the line between Devil's Island and Chebucto Head).

As you are probably aware, this is the second workshop on the topic. Some, but not all of you, were at the first workshop, which was held at the same time last year. The 2000 workshop followed consultations between staff of the Federal Department of Fisheries and Oceans (DFO) and the Halifax Regional Municipality (HRM), as a result of which it was decided that the time was right to hold discussions with other interested parties on the launching of an initiative on the restoration and preservation of the environment of Halifax Harbour. The discussions recommended by DFO and HRM took place through the mechanism of workshop #1.

In summary, the 2000 Workshop consisted of sessions in which papers were presented on:

(a) the ecological description of the harbour;
(b) the anthropogenic stresses on the harbour;
(c) the federal and provincial regulations applicable to the harbour; and
(d) the interests of non-regulatory stakeholders.

[2] The Fisheries Act defines fish habitat as "Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes."

This was followed by "looking to the future" discussions (in small groups) on preserving the environment of the harbour, which led to the identification of key issues and suggested actions.

The interest and enthusiasm of the March 2000 workshop participants was such that DFO and HRM decided to proceed towards the launching of an initiative on the restoration and preservation of the environment of the harbour. Hence this second workshop, the structure and objectives of which are outlined below.

This workshop comprises five sessions (parts) that form a logical progression leading to the development of recommendations in support of the preservation of the environment of the harbour:

(1) The state of environmental knowledge;
(2) Spectrum of harbour activities;
(3) Measurable impacts on fish habitat. (includes a summation of available knowledge)
(4) Achievable goals.
(5) Development of recommendations (see below).

The objectives of the workshop, which will be specifically addressed in Part 5 of the program, are to:

(A) Review available knowledge on the harbour (Parts 1 to 3);
(B) Consider possible achievable goals on the preservation of the harbour's environment (Part 4);
(C) Develop a vision statement (or statements) applicable to the preservation of the environment of Halifax Harbour that encompasses the views of all the groups represented at this workshop (Part 5); and
(D) Develop recommendations (to DFO, HRM, other agencies, etc.) aimed at addressing:
- knowledge gaps;
- abating or containing contamination sources;
- preserving existing habitats;
- enhancing aesthetic and other values of the harbour; and
- other related issues.

It should be noted that the envisaged Halifax Harbour program would be a cooperative initiative, involving a variety of government agencies, NGOs, stakeholders and other interests; also that it would be complementary to the Harbour Solutions Project. The program should include a consultative process that takes into account the interests of all stakeholders including the tourism industry and the 325,000 residents on the Halifax Inlet.

Part 2

Halifax Harbour: What Do We Know and What Do We Need to Know?
-Ken Mann, DFO Scientist Emeritus

Introduction

This paper summarizes what we know about the ecology of Halifax Harbour, as presented at the first and second workshops "Preserving the Environment of Halifax Harbour". The material is presented in note form.

The harbour as an estuary

From the patterns of water circulation and the presence of all the essential elements of the flora and fauna, we know that in spite of all the man-made changes, Halifax harbour still functions as an estuary. The inflow of fresh water drives a current seaward at the surface, while near the bottom, salt water moves into the estuary at the mouth to compensate for the outward flow at the surface. Estuaries act as traps for nutrient material entering with the rivers and with the salt water near the bottom. They are therefore more productive than the open sea, and in the past Halifax harbour was noted for the abundance of fish and shellfish.

The physical environment

The geological history, surficial and bedrock geology are well known. During the growth of the Halifax-Dartmouth-Bedford community there has been extensive infilling of the margins of the harbour, with corresponding loss of shallow-water habitat. The watersheds of the Sackville River and other freshwater sources have been heavily modified by urban development. Recent infilling has been by the use of pyritic slate removed during other developments. Studies are in progress to determine whether this material has any deleterious effect on the marine environment.

The biological community

The expected groups of plants and animals are present in the harbour, but in lesser quantities than in earlier times. We believe that this is the result of the loss of shallow water habitat and the contamination of the harbour with silt, sewage, metals and organic substances. Of the marine mammals, we see harbour seals, porpoise, dolphins and occasional right whales. A good variety of groundfish and pelagic species are harvested in the outer harbour. Pollock, herring, mackerel and smelt are fished for bait in the inner harbour. Salmon, sea trout, gasperau and eels pass through the harbour on their way to the rivers. A good variety and abundance of aquatic birds occur in the outer harbour.

Lobsters are fished extensively, especially around McNab's Island and seaward from there. There is limited fishing in the Northwest Arm and Bedford Basin. Clams and mussels are abundant throughout the harbour, but are closed to harvesting on account of fecal coliform contamination.

Contaminants

The harbour receives almost 200 million litres of raw sewage per day, from 26 outfalls, all situated seaward of the narrows. Plans for treatment of the sewage are being developed. There is a sewage treatment plant near the landward end of Bedford Basin. The effluent is rich in plant nutrients such as nitrate and phosphate.

Reported oil spills averaged over 80 per year in the period 1994-1999, but the rate of occurrence is declining.

An unknown amount of leachate enters the harbour from the old city dump near the narrows.

The effect of contamination

Sewage effluent. Untreated sewage effluent contains organic solids, dissolved nutrients and contaminants. Organic solids settle on the bottom and consume oxygen from the water. The deep part of Bedford Basin has low oxygen content for part of each year. This limits the number of species of invertebrates and fish that can live there. Dissolved nutrients stimulate the growth of phytoplankton and bacteria. If more are produced than the animals can consume, they settle on the bottom and add to the oxygen demand. Organic solids smother seaweeds and seagrasses in shallow water, leading to loss of fish habitat and reduction of fish and invertebrate production.

Contamination with metals. The estimated annual input of metals to the harbour includes 36 tonnes of zinc and 34 tonnes of lead, with lesser amounts of copper and other metals. It is estimated that the upper 2cm of sediment in the harbour contain 208 tonnes of zinc and 200 tonnes of lead, so the full depth of sediment contains much greater amounts. It is believed that only 10-20% of the input is by way of the sewers, the remainder coming from land runoff, and from sources within the harbour, such as seepage from the old dump and wreckage of ships on the sea floor.

Organic contaminants. The presence of organic contaminants is known from the study of the tissues of invertebrates and fish. A large range of substances is found, but two of the most important are polycyclic aromatic hydrocarbons (PAHs), which occur in the tissues of mussels and polychlorinated biphenyls (PCBs) which are found particularly in the digestive glands of lobsters. The mussels show a seasonal rise and fall in PAH content. From 18 sites studied, many show low background levels, but some sites show a marked elevation of PAH content. Some PAH's are clearly associated with petroleum hydrocarbons. The harvesting of mussels is prohibited, but the prime reason is their contamination with fecal coliform bacteria.

Lobsters accumulate both PCBs and PAHs in their digestive glands. The levels do not exceed the allowable limits for human consumption. There is a decrease in concentration in lobsters taken along the gradient from the industrialized inner harbour to the mouth of the estuary.

What more do we need to know?

The priorities in collecting further scientific information depend on our objectives. For example, one may wish to halt or reverse the degradation of the estuarine system, or one may restrict the objective to trying to ensure that future developments do not further contribute to degradation.

To halt or reverse system degradation

To halt the degradation caused by sewage contamination, obviously we need sewage treatment. However, it is likely that the effluents of treatment plants will still contain plant nutrients such as nitrate and phosphate, and some organic solids. We need to know the expected composition of the effluents, in order to predict their effect on the plankton and on the bottom communities. We need to understand how the water circulation in the harbour will affect the distribution of material from the effluent pipes, and for this we need a good physical model of water movement. Such a model may exist, but it has not been presented in these workshops.

To halt the degradation caused by metal contamination we need to consider both the materials entering the harbour on a daily basis and the accumulated material in the sediments. We need to know the details of the origins and pathways of the incoming metallic contaminants that are not in the sewage (about 80% of the total). For example, how much is in the leachate from the old city dump, and how much in the waters of the Sackville River? Obviously, a strong program to reduce contamination at source is needed, but if a significant proportion is leaching from the old dump, or from ships on the harbour floor, special measures may be needed to contain it.

Sediments containing organic matter may be oxidized in the upper few millimetres, but deeper in the sediment conditions are likely to be anaerobic. Disturbance of sediments, for example by anchors, or by the turbulence created by ships' propellers, is likely to change the state of oxidation and may cause the release of metals bound in the sediments. We need much more information about these processes. Some have asked whether we should be aiming to remove contaminated sediments from the harbour. At present it seems that it would cause more harm than good, by releasing large quantities of contaminants. Furthermore, disposal of contaminated sediments would present a major problem. It may be that leaving the sediments in place, to slowly oxidize over time, with a gradual release of contaminants, is the best course of action.

Similar remarks apply to organic contaminants in the sediments. In addition to PAH's and PCB's, there is a long list of organic contaminants that have been identified. There is much work to be done in identifying the origins and fates of these substances. While reduction of contamination at source is obviously required, a deeper understanding of the processes leading to contamination of organisms in the harbour would facilitate the setting of priorities in the cleanup process.

To ensure that future developments do not cause further degradation. In any future development on the shores of the harbour, infilling should be kept to a minimum, since infilling reduces shallow water productivity and hence the productivity of the whole system.

For any essential infilling, we need to know full details of the size and type of habitat that will be destroyed. We also need to know details of possible disturbance of the sediment during construction, because of the risk or releasing contaminants.

Details are also needed on the nature of any infilling material, so that its possible interaction with the water and sediments can be investigated.

Interpretation of the facts

Although we know that Halifax harbour still functions as an estuary, its functioning has been impaired by man-made changes, with the result that the harbour is much less productive of fish and invertebrates than in former times. Specifically,

- Structures built by infilling have removed an estimated 40% of the habitat for seaweeds and seagrasses, with the accompanying loss of fish habitat and productivity
- Soil erosion in the basin of the Sackville River has led to the smothering of large areas of benthic habitat with silt
- Discharge of large volumes of untreated sewage has smothered large areas of seaweed and seagrass, causing loss of fish habitat and productivity.

- The untreated sewage contains large quantities of fecal coliform bacteria, rendering the shellfish unfit to eat
- Organic and inorganic contaminants have entered the system with sewage, river runoff and leachate from the old city dump at Seaview Point. As a result, lobsters, shellfish and fish are contaminated with organic and inorganic substances to a level that is judged not injurious to human health, but which may affect the growth or reproduction of the organisms themselves.

Part 3

The Future of Halifax Harbour

Proposed Shared Vision for Halifax Harbour

The participants of workshop #2 divided in six work groups were asked to elaborate statements or mottos that would reflect a common vision for the future of Halifax Harbour. It had been intended that one or more of these statements or mottos would be adopted by the workshop as the recommended vision to spur the preservation activities for the environment of Halifax Harbour. All six groups provided such statements (Appendix C). However one additional statement given as a parting thought in the presentation of group six report, seemed to capture the imagination of those present best of all.

"Halifax is its Harbour."

This statement, although brief, implies a tight link between a natural harbour and the human infrastructures on adjoining lands. It seems reasonable, therefore, to hope that the pride, love and attention the citizens bestow on their communal environment, can be made to extend to the body of water that adjoins it. On the basis of that premise we should expect the Halifax Harbour to be afforded an amount of care and nurturing equivalent to that given to our towns and cities.

The adoption of this short statement as a motto reflecting the vision for the future of the Harbour is recommended.

Summary of Groups Recommendations: ***(For the Preservation of the Environment of Halifax Harbour)***

The participants were also asked to formulate several realistic recommendations aimed at identifying the knowledge gaps, abating or containing contamination sources, preserving existing habitats and, enhancing aesthetic and other values of Halifax Harbour. The six working groups delivered over 35 separate recommendations to the plenary assembly. All these recommendations bore on the revitalization of Halifax Harbour's biological environment, aesthetic values and public involvement. The editors sought to find the common points between these statements and, as a result they where able to reduce this large input down to five (5) major organizational recommendations and nine (9) specific (pro-active) recommendations. All these recommendations are listed below in order of priority without reference to the originator groups.

Organizational Recommendations

- Establish an independent, jointly funded group, whose purpose will be to:
  - Develop an overall action plan
  - Galvanize and consolidate stakeholders participation
  - Gather, digest, disseminate and consolidate information
  - Identify and address knowledge gaps
  - Determine Habitat quality goals
  - Report on the integrity of the Harbour ecosystems

- Seek the commitment and involvement of the three levels of government (Federal, Provincial and Municipal) and work at fostering a political will to resolve the environmental problems in Halifax Harbour.

- Move the workshop ideas to City Hall
- Involve the inhabitants of the Inlet

- Develop an electronic data base inventory of Halifax Harbour ecosystems, its pollution and contamination sources.
- Seek input from all level of stakeholders, particularly the community at large
- Establish community based monitoring
- Design projects to be executed by community groups
- Establish usage zoning as a management tool.

Specific Projects Recommendations.

- Separate domestic sewer system from storm run off over next two decades.
- Conduct a systematic assessment of all contaminants and continue the elimination of single source points (HRM source control).
- Promote the study of biological indicators
- Reduce Pathogens and Toxins.
- Promote the creation/improvements of physical numerical models of primary forces acting on the Halifax Inlet (wind, water currents etc.).

- Promote plans to improve aesthetic values of Halifax Harbour.
- Promote projects aimed at enhancing landscape values.
- Promote plans and works aimed at restoring Freshwater habitats and marine shoreline habitats in the littoral and sub-littoral zones for macrophytes. (shoreline remediation).
- Review Industrial Development projects one at a time in order to seek remediation and or compensation for affected or lost habitats.

Finding a Champion for Halifax Harbour.

Throughout the debates in workshop 1 and 2 a recurrent note was sounded: "Halifax Harbour Needs a Champion!" Many government agencies regulatory or not should contribute to the preservation of ecological integrity in Halifax Harbour but one or more must take the lead, establishing themselves as a "benevolent dictatorship" to organize and guide the other stakeholders' participation.

Four of the six working groups in workshop 1 identified HRM as the logical leader. One group identified DFO because of the new Oceans Act and its mandate for Integrated Coastal Zone Management. Two of the six working groups in workshop 2 directly named HRM as the logical champion. The remainder favored the formation of a special, jointly funded, group formed initially by government agencies but capable of functioning independently from any particular government agenda.

On the basis of the recommendations made by workshop participants and also on the basis of mandated responsibilities. The all indicated leaders for that initial trust on the revitalization of Halifax Harbour, namely the formation of an independent group to oversee the project, are:

- Halifax Regional Municipality
- Fisheries and Oceans Canada
- Environment Canada
- Nova Scotia Department of Environment and Labor.

The first task incumbent on such a group would be to produce a white paper outlining the goals and objectives for the preservation and revitalization of Halifax Harbour. This white paper should include, but not be restricted to, the following :

- A roster of locally available experts
- The elaboration of a communication strategy
- The elaboration of a baseline inventory of

the biological resources of Halifax Harbour

- A review of precedents i.e. Hamilton Harbour, Boston and New York Harbours etc.
- Plans for community involvement (NGO's, Watershed groups etc.)
- Alternative plans for addressing large key issues i.e. Seaview Point contaminant leachates
- Harbour species management plans
- Plans to introduce Harbour use zoning concept
- Alternative proposals for a show case (fail proof) project
- Plan to hire an overall project manager
- Organization of a public symposium

Concluding Statement: ***(The Future of Halifax Harbour)***

During two workshops held in March 2000 and 2001, over 130 key persons were consulted. These people represented the three levels of Government, industry and a broad cross section of the inhabitants of the Communities on the shores and in the watershed of Halifax Harbour. The first workshop (2000) concentrated on establishing Halifax Harbour as a living ecological entity and describing the regulatory environment in some details. The second workshop (2001) described and discussed the biological environment conditions in the Harbour, reviewed the available scientific knowledge and assessed the impacts on fish and fish habitats of over two hundred years of use as an industrial sea port. A major output of the second workshop was a vision for the future of Halifax Harbour and a series of recommendations for stakeholders activities to work towards achieving predetermined goals.

Through these two workshops the Halifax Inlet was revealed as a surviving ecological entity. Although the Harbour has lost much of its pristine value and appearance, the participants of both workshops were unanimous on the importance of preserving and enhancing the natural resources of Halifax Harbour for future generations to enjoy. Workshop #2 participants where also unanimous on the need and value of HRM's present sewage sanitation project, but there was general agreement that many more serious problems would continue to exist long after the sewage problem was brought under control, unless concerted and sustained action is taken. The problems relate principally to water column and sediments, metal and organic contamination from a multitude of sources, the cumulative impacts of harbour shoreline and bottom manipulation such as dredging and infilling and the impacts of overall shipping activities past, present and future.

Workshop #2 participants fully recognized that revitalization of the harbour and its watershed must be a long-term undertaking, for example ten years are predicted to complete HRM's proposed sewer treatment system. However, some of the data presented by scientists at the workshops already revealed a reverse trend in contaminants accumulation in the sediments due to source control measures put in place two decades ago. The presence of such encouraging signals in the environmental data was noted by the participants, who in addition wish to see the implementation of a renewed systematic and well co-ordinated effort to rid Halifax Harbour of pollution and as much of the contaminants as possible. It was conceded that little can be done about some pockets (hot spots) of contaminants buried deep in the sediments.

The participants also expressed a clear desire to see efforts made toward recreating lost fish

and wildlife habitats and lost aesthetic values. They agreed that Halifax Harbour must remain a multiple use body of water. The legitimate demands made by industrial concerns were accepted, but not at the expense of other values.

In conclusion, the common will of the workshop participants may be expressed as follows:

Within 25 years Halifax Harbour must be a healthy environment that offers sustainable multiple use, where biological and aesthetic values are maintained and enhanced on an ongoing basis through integrated management. The decision making process must be knowledge based, as much as possible, but cautious in the absence of specific knowledge. The local community must be well informed about the Harbour, and involved and committed.

Appendix A

WORKSHOP, March 14 & 15, 2000
Preserving the Environment of the Halifax Harbour

Location: ***The Art Gallery of Nova Scotia, 1723 Hollis St., Halifax, NS***
Sponsors: ***DFO and the Halifax Regional Municipality (The Harbour Solutions Project)***

A gathering of regulatory stakeholders to discuss regulatory overlaps, assess the potential for integration of all marine resource management in the Halifax Harbour, and identify opportunities for the conservation and restoration of wildlife habitats and aesthetic values.

Agenda
Tuesday, March 14th

08:00 **Registration (Name Tags & Registration Package)**

08:30 **Opening welcome from DFO**
George DaPont, Associate Regional Director-General

08:40 **Welcome, introduction, purpose & objectives**
Chair, Brian Nicholls, DFO-Retired

Part 1 - The Halifax Harbour - An Ecological Entity

09:00 **The Living Estuary**
Dr. Ken Mann, DFO Emeritus Scientist

09:30 **Historical/Ecological Integrity**
Dr. Ron MacDonald, Parks Canada

10:00 **Coffee Break**

10:15 **Halifax Harbour and Marine Mammals - Life in the Shipping Lanes**
Dr. Paul Brodie, Consultant

10:45 **Geology & Anthropogenic Features of the Halifax Harbour**
Gordon Fader, NRCan. Scientist

Part 2 - Anthropogenic Stresses

11:15 **Domestic Pollution Input**
Roger Percy, John Clark, Dr. Kok-Leng Tay, EC Scientists

11:45 **Keys to Environmental Quality Management In Marine Areas of the Halifax Harbour**
Dale Buckley, NRCan, Emeritus Scientist

12:15 **Lunch Recess (Lunch Provided)**

13:15 **Traffic Quantification, (Shipping, Yachting)**
Capt. Randy Sherman, Harbour Master, Director of Operations

Part 3 - The Regulatory Environment

N.B. *Here follows a series of brief presentations by representatives of the principal regulatory agencies who, either unilaterally or in consultation with one or more regulatory bodies, make important decisions on matters of a development nature in or near the Halifax Inlet. The presenters will endeavor to fully identify the authority or law base that supports their decision making responsibility. The presentations will be limited to 15 minutes and to save time questions relating to these topics will be addressed in a 30-minute period reserved at the end of the session. The chairperson will have to exercise somewhat strict control to remain on schedule.*

13:45 **Canadian Coast Guard (Navigable Waters Protection Act)**
Larry Wilson, CCG Regional Director

14:00 **Halifax Port Authority (Canada Marine Act)**
Capt. Randy Sherman, Harbour Master, Director of Operations

14:15 **Transport Canada (Canada Shipping Act)**
Mike Balaban, TC Senior Marine Surveyor

14:30 **Public Works & Government Services (Public Works Act)**
Dr. Hari Samant, PWGSC, Regional-Manger
Ray Lewis, PWGSC, Client Services

14:45 **Fisheries and Oceans Canada (Oceans Act)**
Faith Scattolon, DFO Regional Director, Oceans Act Coordination Office)

15:00 **Coffee Break**

15:15 **Fisheries and Oceans Canada, (*Fisheries Act S. 35 & 37)***
Brian Thompson, DFO Manager, Habitat Management Division

15:30 **Department of National Defense**
Carol Lee Giffin, DND Formation Environment Officer

15:45 **Environment Canada (Fisheries Act S. 36, Canadian Environmental Protection Act)**
Dave Aggett, EC Enforcement

16:00 **Department of Environment Nova Scotia, (The Environment Act)**
Christine Mosher, NSDOJ, Solicitor

16:15 **Department of Natural Resources Nova Scotia, (Crown Lands Act, Beaches Act)**
Harry Ashcroft, NSDNR Manager, Land Services

16:30 **Department of Tourism & Culture, Nova Scotia (Special Places Protection Act)**
Bob Ogilvie, NS Museum

16:45-17:15 Question and Answer Period - Regulatory Environment
Participants will put forward as many questions relating to the eleven previous presentations, particularly on areas of possible overlap, as can be entertained in the half hour provided and save other questions or comments on cards, provided in the registration package, to be dealt with during the workshop sessions on day two

Wednesday, March 15th

08:30 **Environment Canada, Canadian Environmental Assessment Agency (CEAA)**
Bill Coulter, EC Manager

Part 4 - Non-Regulatory Primary StakeHolders

09:00 **Waterfront Development Corporation**
Bill Campbell, Director, Planning & Development

09:30 **Bedford Waterfront Development Corporation**
Richard Hattin, BWDC Manager

10:00 **Coffee Break**

10:15 **Halifax Regional Municipality (HRM) Harbour Solutions Project**
Maurice Lloyd, HSP Director

10:45 **Planning and Development Services**
Donna Davis-Lohnes, HRM, Planning and Development

Part 5 - The Burlington Harbor Case Study

11:15 **Integrating Habitat Restoration into an Existing Situation**
Victor Cairns, DFO Burlington, Ontario

11:45 **Part 6 - Looking to the Future: Workshops**

Coming to terms with areas of overlap and/or conflict between regulatory agencies; Integrating marine freshwater resources protection with planning and development activities and; co-operating in restoration of wildlife, fish habitats and aesthetic values of the Halifax Harbour.

N.B. The participants have been divided into six approximately equal groups and, with the help of DFO appointed facilitators, they will explore, discuss, debate and record their findings on the following three subjects (two groups per subject). Each group will be expected to give a 10-minute presentation relating their findings, proposals and recommendations. A rapporteur appointed from each group will present their findings to the general assembly of participants. A five minute period will be allocated for Questions and Answers at the end of each presentation.

Group 1 and 2

Coming to Terms with Regulatory Areas of Overlap

- *Identifying the overlaps*
- *Identifying the conflicts*
- *Developing solutions (Hierarchy in the regulations)*

Group 3 and 4

Integrating Halifax Inlet Marine and Freshwater Resources Management

- *How do we ensure that all stakeholder's interests are considered in future projects?*
- *What are the possible mechanisms available to integrate such a wide spectrum of management activities?*
- *Explore alternate proposals.*

Group 5 and 6

Opportunities for the Conservation and Restoration of Wildlife Habitat and Aesthetic Values in the Halifax Inlet

- *What can realistically be achieved?*
- *By whom and at what approximate cost? Possible partnerships?*
- *Are there precedents to guide us in this endeavor?*

12:30 **Lunch Recess (Lunch Provided)**

13:30 **Workgroups: Presentation of Findings**
(Rapporteurs)

14:45 **Part 7 - Summary Conclusions of Workshop**
Brian Nicholls, Chairperson

15:15 **End of Workshop**

N.B. *The Proceedings of the Halifax Harbour Workshop will be published by the Fisheries and Oceans Canada in partnership with the Halifax Regional Municipality (The Harbour Solutions Project). The document will include the papers presented, the four workshop session reports, the summary conclusion and the recommendations made by the working groups.*

Poster Presentations

§ **The Fisheries of the Halifax Inlet**	**Paul Rozee**
§ **Freshwater Stream Losses in the Halifax Harbour Watershed**	**Jennifer Bruin**
§ **Two Centuries of In-filling Activities**	**Paul Rozee**
§ **Seabed Features of the Halifax Inlet**	**Gordon Fader**
§ **The Sediments of the Halifax Inlet**	**Dale Buckley**
§ **Seasonal and Geographical Distribution of PAHs in Mussels in the Halifax Harbour**	**Jocelyne Hellou**

Appendix B

Preserving the Environment of Halifax Harbour
Workshop # 2 March 14th – 15th 2001

Location: Main Auditorium, BIO, 1 Challenger Drive, Dartmouth, N.S.
Sponsors: DFO and Halifax Regional Municipality (The Harbour Solutions Project)

(A gathering of stake-holders from three levels of government, academia, industry, and public interest groups to: review the state of environmental knowledge in Halifax Harbour, identify information gaps in the light of future large developments, and identify required actions for the preservation and restoration of fish and wildlife habitats and aesthetic values in Halifax Harbour.)

Agenda
Wednesday March 14th

07:45 **Registration** *(Name tags and registration packages)*
Debi Campbell, Oceans & Coastal Management Division, DFO

08:15 **Opening Welcome from BIO**
Jacob Verhoef, Director, Geological Survey of Canada (Atlantic), NRCan

08:30 **DFO's Aspirations for Fish Habitat in Halifax Harbour: Realities and Opportunities**
Jim Ross, Biologist, Habitat Management Division, DFO

09:00 **Objectives of Workshop #2**
Brian Nicholls, Workshop Chair, DFO – retired

Part 1 – The State of Environmental Knowledge

09:25 **Highlights of previous Workshops on Halifax Harbour (1989...)**
Don Lawrence, Research Scientist, Science Branch, DFO

09:55 **Coffee Break**

10:10 **Historical Perspective of Metal Contaminants in Halifax Harbour**
Dale Buckley, Emeritus Scientist, NRCan
Contaminants in Halifax Harbour
Phil Yeats, Scientist, Marine Chemistry Section, DFO
N.B. Time slot to be shared, Buckley speaks to sediments and Yeats speaks to water column

11:00	**Halifax Harbour: The Geology and Evolution of Marine Habitat** ***Gordon Fader, Scientist, Geological Survey of Canada, NRCan***
11:30	**The Fish Fauna of the Harbour** ***Andrew Hebda, Curator, Nova Scotia Museum of Natural History***
12:00	**The Benthic Fauna** ***Don Peer, Scientist, DFO - retired*** ***Presented by Susan Belford, Consultant, Jacques Whitford***
12:30	**Lunch** ***(BIO Cafeteria catered)***
13:30	**Other Wildlife and Their Habitats** ***Tony Lock, Scientist, Environment Canada***
	Part 2 – Spectrum of Harbour Activities
14:00	**Major Development Projects of the Past** ***Alan Ruffman, Consultant, Geo-marine Associates***
14:30	**Cumulative Infilling Activities** ***Clarence Spencer, Scientist, Environment Canada***
15:00	**Coffee Break**
15:15	**Major Future Development Projects** ***Bill Campbell, Director, Halifax Waterfront Development Board*** ***David Bellefontaine, Director, Port Authority*** ***N.B. This time slot to be shared by the two above speakers***
	Part 3 – Measurable Impacts on Fish Habitat
16:05	**Changes/Degradation of Benthic Habitats** ***Annamarie and Bruce Hatcher, Dalhousie / Canfish***
16:50	**Changes in Planktonic Microbiota** ***Bill Li, Research Scientist, Science Branch, DFO***
17:20	**End of Day One**

Thursday March 15th

08:15	**Summation of Available Knowledge: What else do we need to know?** ***Ken Mann, Scientist Emeritus, DFO***

Part 4 – Achievable goals

08:45 **Halifax Harbour Solutions Project: Update**
Tony Blouin, Assistant Director, Halifax Harbour Solutions Project

09:15 **The Hamilton Harbour Case: Lessons learned**
Victor Cairn, Resource Manager, DFO (Hamilton, Ontario)

09:45 **Eliminating Sources of Contaminants**
Roger Percy, Scientist, Environment Canada

10:10 **Coffee Break**

10:20 **Pollution Source Control**
John Sibbald, HRM, Environmental Services and Engineering Approvals

10:45 **Community Perspective on Preserving the Environment of Halifax Harbour**
Patricia Manuel, Professor, Nova Scotia College of Arts and Design

11:15 **HRM Activities pertaining to the Aesthetic Value of Halifax Harbour**
Simpson McLeod, HRM Planning Dept. - Retired

11:40 **DFO on Recovering Lost Habitats**
Bob Rutherford, Biologist, Oceans & Coastal Management Division, DFO

12:05 **Summary of Workshop # 1 Recommendations**
Brian Nicholls, Workshop Chair, DFO - retired

12:30 **Working Lunch** *(BIO Cafeteria Catered)*

Part 5 – Workshop: Developing Recommendations

N.B. The participants will be divided into reasonably sized equal groups and, with the help of pre-named facilitators they will be asked to work at elaborating a statement or Motto encompassing a vision for the future for Halifax Harbour. One or several of these will subsequently be adopted by the workshop as the recommended vision for the preservation of the environment of Halifax Harbour. In addition they will elaborate several realistic recommendations aimed at addressing: 1) the knowledge gaps identified; 2) abating or containing contamination sources; 3) preserving existing habitats; and, 4) enhancing aesthetic and other values of Halifax Harbour.

14:00 **Group Reports and recommendations to Plenary Session**

15:00 **Coffee Break**

15:15	**Development and Approval of Workshop Final Recommendations to DFO, HRM and other Agencies.**
16:15	**Closing Remarks** *(and drawing of Door Prize - Nova Scotia Crystal)* *Brian Nicholls, Workshop Chair, DFO - retired*
16:30	**End of Workshop**

Posters Presentations

The Fisheries of Halifax Harbour	**Andre Ducharme** **Paul Rozee**
Bedford Basin, Nova Scotia: An Interpretation of Seabed Materials, Features and Processes on Multibeam Bathymetry	**Gordon Fader** **Robert Miller** **Bruce MacGowan**
Environmental quality assessment of Halifax Harbour: Geological and Geo-chemical Perspective	**Dale Buckley**
Lost Freshwater Habitat	**Jennifer Bruin**
Chlorobiphenyls from a non-Aroclor source: Where do they come from?	**T.King** **P. Yeats** **J. Hellou** **S. Niven**
Low molecular weight non-ortho chlorobiphenyls in mussels collected in and around Halifax Harbour	**T.King** **J. Hellou** **V. Kitko**
Levels and source apportionment of polycyclic aromatic hydrocarbons (PAHs) and sulphur heterocycles (PASHs) in sediments and mussels	**J. Hellou** **T.King** **J. Leonard** **T. Milligan** **S. Stellar** **P. Yeats** **V. Zitko**
Shoreline Classification and Coastal Resources of Halifax Harbour Area	**Roger Percy**

Appendix C

The Groups Vision Statements

Group 1
Bringing life back to the harbour (fish, plants, habitats and people's interest)

Group 2
To achieve a continual improvement to the aesthetic, ecological and human health aspects associated with Halifax Harbour

Group 3
Elements for a Vision Statement

- Something for future generations to be proud of
- Safety and health issues important
- Aesthetic aspects considered
- Biologically healthy ecosystem
- Improve on status quo daily
- Must apply consistently throughout the Harbour

Group 4
A healthy, attractive, accessible and productive Harbour environment in which present and future generations can accommodate multiple uses in a sustainable manner

Group 5
A healthy harbour is an investment in the future not a cost

Group 6
Ecological integrity of the greater Halifax Harbour ecosystem including its present human population